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Hamilton Hydro Electric System

REGULATIONS AND CONDITIONS OF SERVICE FOR THE SUPPLY OF ELECTRICAL ENERGY

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PREFACE

This booklet has been prepared by the Hamilton Hydro Electric System to provide information on its requirements pertaining to electrical installations that are to be located on consumer premises and which are necessary to provide service and metering facilities.

The contents describe the arrangements, clearances, materials and division of cost involved to meet these requirements, none of which are intended to limit, restrict or interfere with the Rules and Regulations of the Ontario Hydro Electrical Safety Code in any way.

This information is made available for use of those designing and installing electrical equipment so that the requirements of the Hamilton Hydro Electric System can be provided for in the initial planning stages.

I OVERHEAD PLANT

1. Supply

All wires for supply circuits are supported by poles located on City Street allowances.

2. Services for all types of loads supplied at voltages under 750 volts

a) Overhead Wires

- (i) the Hydro will supply and install up to 100 ft. of service wire over private property, measured from the street line.
- (ii) the customer is responsible for installation of any service in excess of 100 ft. or past the first point of attachment.

b) Service risers and masts

- (i) the location of the service riser is dependent upon the meter location and the latter must be approved by the Hydro Meter Department for all initial installations and for any change of location later
- (ii) the hardware for terminating the service wires on the service mast must be located so the lowest wire will be a minimum of 16 ft. above final grade
- (iii) the minimum size mast acceptable to the Hydro is the standard high tensile steel pipe type which is suitable for use on all service ratings up to and including 200 amperes

- (iv) masts made from steel with sections either 4" x 4" x 3/8" angle or 6" x 2" channel at 13 lbs/ft. are acceptable for 400 Amp and 600 Amp rated services where the length of service wires does not exceed 100 ft.—see (xiii) below for diameter and spacing of holes for installation of service racks
- (v) for services rated above 600 Amp and for service conductors #2/0 or larger in excess of 100 ft., the strength requirements of the service masts must be discussed with the Hydro Meter Department
- (vi) service masts must be secured to the building as shown in Fig. 8, 9 or 10 to be acceptable to the Hydro

it is realized that the wall to which the mast is attached is sometimes the weakest part of the installation. In such cases it is recommended that a back-up guy be installed to transfer some of the strain on the mast to another point on the building

- (vii) all service masts extending more than 5 ft. above a building must be guyed with 1/4" or 9/32" galvanized or copper clad steel guy strand
- (viii) the slope of any guy must not be steeper than 4 to 3 (must extend 4 ft. horizontally for every 3 ft. vertical drop)
- (ix) guys must be dead ended with bolted clamps, preformed guy-grips or Western Union type splices

- (x) the hardware used for attaching guys to buildings must consist of galvanized guy straps or eye bolts secured to structural members (not roofing boards, siding, etc.) with bolts or lags not less than 3/8" diameter
- (xi) if the service attachment hardware is to be installed on an outside wall that is of masonry block construction or has stucco or plaster finish, or where proper support is difficult to find, the necessary rack or bracket normally supplied by Hydro will be left with the electrical contractor and it will be his responsibility to install same
- (xii) the recommended clearance over roofs is 8 ft. above the highest point of a flat roof that can be readily walked upon and 3 ft. above peaked roofs that cannot be readily walked upon
- (xiii) where 3 spool racks are to be installed, 2—9/16" holes on 16" centres are required and located so the rack will face the direction from which the service will originate
- (xiv) if the service terminates or changes direction on a pole located on private property, the guying required is the responsibility of the customer
- (xv) hardware installed on the walls of buildings to terminate services shall be secured solidly enough to withstand the pull of the service wires under wind and ice loading

c) Underground cable from Hydro pole

- (i) the customer is totally responsible for the installation of an underground service from a Hydro approved pole location and must conform to the requirements of the Ontario Hydro Electrical Inspection Department and the City of Hamilton Engineering Department
- (ii) the customer will also be required to sign a pole attachment agreement with the Hydro

3. Services supplied at voltages higher than 750 volts

a) Overhead Wires

- (i) the Hydro will supply and install up to 100 ft. of high voltage primary wire over private property, measured from the street line
- (ii) the customer is responsible for the installation of any service in excess of 100 ft. or past the first point of attachment
- (iii) the customer must provide a pole or structure suitable for terminating the incoming aerial service and any guying required to make it safe and serviceable
- (iv) where Hydro owned transformers are to be mounted on a pole or pole structure located on private property, the Hydro will supply and install such poles with the customer being responsible for any intermediate poles required and all guying deemed necessary

(v) where transformers are located on private property for the benefit of the customer, he is responsible for the installation of the low voltage service from the transformer to his electrical room and any guying required

b) Underground high voltage cable from Hydro pole

(i) Commercial and Industrial loads
when a high voltage cable installation is required to serve premises where the nature of the load is not totally residential, the customer is responsible for the costs of the complete installation including ducts, cables, terminations, protective devices, etc.

if the contractor for the owner cannot provide qualified personnel to do all of the work involved, the Hydro forces will assist on a cost-plus supervision basis

(ii) Apartment and Condominium loads
when a high voltage cable installation is required to supply Hydro owned transformers installed in a vault or room provided on such premises, the Hydro will supply and install all ducts and cable on the City Street allowance, plus up to 100 ft. of cable on private property from the street line in, complete with terminations

the customer is responsible for the installation of all ducts on private property out to the street line and any cable in excess of 100 ft. from the street line plus the cable terminations on the load end

see "Transformer Vaults" for additional Hydro requirements

II UNDERGROUND PLANT

1. Supply

All cables for supply circuits are placed underground on City Street allowances.

2. Services

a) Commercial and Industrial loads

- (i) when service is required to serve premises where the nature of the electrical load is not totally residential, the Hydro will supply and install the cable and ducts to the street line only
- (ii) the customer is responsible for the installation of all plant required to extend service from the street line to the point where it terminates on his property and install the cable terminations at that point

b) Apartment and Condominium loads

- (i) where a customer provides a room or vault on his premises for Hydro transformers, the Hydro will supply and install the ducts and cable on the street allowance to the street line, cable only up to 100 ft. past the street line on private property and the cable terminations on the load end
- (ii) the customer is responsible for the ducts on private property from the transformer room or vault to the street line and any cable in excess

of 100 ft. from the street line, with its associated terminations on the load end

- (iii) where the Hydro is requested to supply and install poles on private property to support transformers, the customer is responsible for all ducts and cable from the street line in, plus cable terminations, protective devices, etc., as well as all underground secondary cable from the transformer pole to the electrical room, or all aerial service wires and any guying that may be associated with them

III TRANSFORMER VAULTS

Requirements for transformer rooms or vaults housing Hydro-owned oil-filled transformers for loads in excess of 75 KVA where a pole structure is not acceptable:

1. Room and Vault Size—

Load requirements and plans for the building must be discussed with the Hydro Engineering Department so that the size and shape can be agreed upon. In selecting the location, the possibility of a transformer noise problem should be considered and the necessary precautions taken.

2. Roof—

- a) Shall be reinforced concrete not less than 6" thick.
- b) Ceiling to be neatly finished.

3. Walls—

- a) Shall be reinforced concrete not less than 6" thick, or
- b) Brick not less than 8" thick, or
- c) Solid masonry blocks not less than 8" thick, or
- d) Load-bearing hollow masonry block not less than 12" thick
- e) Walls shall be neatly finished

4. Access—

- a) Access to rooms and vaults shall be from outside the building only.
- b) Rooms and vaults shall be located so that Hydro vehicles shall have free access to them at all times.
- c) This access must provide for installation and removal of transformers and have provision for workmen to enter and leave safely.
- d) Every doorway to a transformer room or vault shall have a door sill not less than 4" high. Door to open outwards.
- e) Door—shall be a minimum of 3' x 7' Kalamein fire rated door or equivalent. Door to have door knob and hasp for Hydro padlock.
- f) Grating—shall be a minimum of 5' x 5', double hinged, with retaining chains to hold grating halves to a minimum 15-degree position off vertical, with provision for Hydro padlock. A suitable ladder shall be provided if necessary.

5. Curb Sump and Drain—

- a) Rooms and vaults shall have a 4" concrete curb enclosing transformers and sump.
- b) Sump shall be located within curbed area at one end. Sump shall be constructed to retain all the oil contained in the largest transformer therein.
- c) Floor area outside of curbing shall have a drain connected to storm sewer.
- d) The floor shall slope not less than 1/4" per foot to drain.

6. Ventilation—(All material used to be fireproof)

- a) Ventilation shall be provided directly to the outside of the building.
- b) The outlet opening shall be near the ceiling.
- c) The inlet opening shall be near the floor and shall be located, or ducted if necessary, so as to direct a flow of air around the transformers.
- d) Openings shall be protected by louvres and substantial fixed metal screens with mesh not larger than 3/4".
- e) The total combined area of the two air vents, less the area of the protective louvres and screens, shall be equal to 3 square inches for each kilovolt-ampere of installed transformer capacity.

7. Lighting—

Every room or vault shall be provided with an adequate lighting system controlled by a mercury switch located at the entrance.

8. Primary Cable Ducts—

- a) The contractor is responsible for the supply and installation of the ducts from the transformer room to the street line.
- b) The Hydro will extend the ducts from the street line to the pole or manhole on the street, (primary cables only) and advise when the installation costs are chargeable to the contractor.

9. Low voltage—

- a) All secondary wiring from electrical room to Hydro transformers, including neutral jumpers between transformers, to be supplied and installed by the contractor. This includes any cable clamps required to support the cables in the room and the installation of proper terminating devices on the cable end, e.g. Corflex cables must be complete with gland fitting and the conductor exposed and sized ready for insertion into the connector on the transformer bushing. If metallic sheaths are to be bonded together, such bonding shall be supplied and installed by the contractor.
- b) Contractor shall supply connectors for multi-conductor connection to Hydro transformer terminals.

- c) The Hydro shall install bonding and make all secondary connections to Hydro transformers. This shall mean insertion of the previously terminated cables (see item a) into the transformer terminals and tightening of same.
- d) Holes in wall of transformer room or vault required for secondary cables shall be sealed to prevent gases escaping into electrical room.

10. Energizing—

Contractors (General & Electrical) must have all work related to the transformer room finished to Hydro specifications a minimum of two weeks prior to the required in-service date. Once the transformers have been energized, the room will be locked and kept locked by a Hydro lock.

11. Hydro to be consulted Re—

- a) Meter locations.
- b) The supply and installation of the incoming primary cable, terminations, protective devices and the division of cost involved.
- c) Estimates of cost involved. These will be estimates only and any chargeable work will be done on a cost-plus-supervision basis.
- d) Approval for all plans for metalclad or metal enclosed designs where metering equipment is to be installed.

IV LARGE LOADS

1. 4160 Volt Supply

- a) The Hydro will supply and install all transformers, with Hydro approved secondary voltages, for one-step transformation up to a maximum of 500 KVA capacity.
- b) For loads 75 KVA and over the customer must provide an acceptable location on his property for installation of Hydro owned transformers.
- c) The load must be metered on the secondary side of the Hydro owned transformer.
- d) The customer may provide his own transformation if he wishes, in which case he must make provision for metering at 4160 volts and a transformation allowance will be deducted from his energy bills for such installation.
- e) Loads greater than 500 KVA will be supplied from 13,800 volt circuits.

2. 13,800 Volt Supply

a) Single Metered Customer

- (i) the Hydro will supply and install one-step transformation with Hydro approved secondary voltages, and associated switchgear, for loads up to 1000 KVA.
- (ii) such services must be metered on the secondary side of the Hydro owned transformers

- (iii) the customer must provide an acceptable indoor location for installation of the Hydro owned transformer and associated primary switchgear
- (iv) the customer may provide his own transformation and switchgear if he wishes, in which case he must make provision for metering at 13,800 volts and a transformation allowance will be deducted from his energy bills for such installation
- (v) a single metered customer with a load exceeding 1000 KVA must install his own transformation and switchgear and make provisions for metering at 13,800 volts. A transformation allowance will be deducted from his energy bills for such installation

b) Multi-Customer Complex

- (i) the Hydro will supply and install one-step transformation, with Hydro approved secondary voltages, and associated primary switchgear. See 2. a) above for individual customers with loads exceeding 1000 KVA
- (ii) the owner must provide an acceptable indoor location for installation of the Hydro owned transformers and associated primary switchgear
- (iii) all individual loads must be metered at the secondary voltage
- (iv) if the owner of a complex wishes to supply and install his own substation he must provide for a

single metering arrangement at 13,800 volts. A transformation allowance will be deducted from his energy bills for such installation.

V CUSTOMER OWNED SUB-STATIONS

- a) Drawings must be forwarded to the Hydro Engineering Department for examination with respect to provisions for metering, isolating and protective devices, termination of incoming supply conductors, etc.
- b) It is Hydro practice to supply service from its existing plant on city street allowance to the nearest convenient point on the customers property line.
- c) Alternate supply, service, security, etc. should be discussed with the Hydro Engineering Department.
- d) Where relays are to be used in conjunction with circuit breakers on the main supply, they will be calibrated and set by Hydro personnel with 50% of the cost borne by the Hydro for the initial calibration.

VI SMALL LOADS

- a) The Hydro will provide service for single phase loads at 120/240 volts and three phase loads at 600 volts only, from their supply circuits on city street allowances.

- b) A customer is permitted one service at each voltage.
- c) Only one service of the same potential and characteristics shall be run to any premises from the Hydro system.
- d) The maximum total load must be less than 75 KVA to qualify for service from Hydro supply circuits on city street allowance—this limit applies to the load where only one service is required and also to the combined load on the two services if both voltages are required.
- e) See under “Large loads” for loads 75 KVA and over.
- f) Where the owner of a premises requests an overhead supply requiring transformer capacity of 75 KVA or greater to provide for various smaller loads, such as blocks of row houses or apartment buildings, the owner shall provide an acceptable transformer location or locations on the premises for the transformer or transformers. Hydro will provide one point of supply and the owner shall be totally responsible for all primary or secondary distribution from that point. See Section I for Overhead Supply and Section II for Underground Supply.
- g) If a customer requires a three phase service at some voltage other than 600 volts (e.g. 120/208 volts or 347/600 volts) he must provide space in a transformer room or vault, or a location for a pole or poles on his

property to accommodate the necessary transformers — transformers would be supplied from primary circuits. See under "Services supplied at voltages higher than 750 volts" (Item 1-3) for division of costs.

VII RESIDENTIAL UNDER- GROUND DISTRIBUTION SYSTEM

- a) Underground distribution is mandatory in all new residential surveys and will be installed for a subsidy based on the difference in cost between underground and overhead construction. This charge will be made on a footage basis assessed against all properties abutting the municipal road allowance and any required easement."
- b) Underground will be installed on the street allowance rather than rear lot.
- c) Where rock digging is encountered, the extra costs due to the rock excavation will be billed to the developer in addition to the standard subsidy.
- d) Where underground servicing is requested for large developments, and where distances are too great to supply from the municipal road allowance, it may be necessary for the Developer to provide registered easements on the property in favour of the Hydro for the installation of their distribution plant.

VIII RESIDENTIAL SERVICES IN UNDERGROUND SURVEYS

This specification will cover the standard arrangement for 100A and 200A services to single family dwellings, duplexes and multiplexes. Any deviation from this standard must be approved, prior to installation, by the Hydro Engineering Department and Ontario Hydro Inspection Department.

1. Responsibility of Hydro

- a) The Hydro will supply and install appropriately sized conductors for 100A and 200A individual services up to the line side of the meter base on single family dwellings, duplexes and multiplexes where each separate living area and the land on which it is situated can be sold and owned as a unit.
- b) Row Housing Blocks (rental and condominium style where land is common property)
Blocks of 6 units or less shall be supplied from a single service to a multiple meter base trough located on one end of the block, and such end shall be designated by the Hydro. If there are more than 6 units per block, more than one meter base trough can be installed on the block with a separate service provided for each. For electrically heated multiplexes it will be necessary to contact the Hydro well in advance to discuss metering arrangements.

- c) The owner is responsible for any cost involved in altering the service should he decide to change the service location after it has been approved and the service installed.

2. Responsibility of Owner or His Contractor

- a) Give ample advance notice to Hydro of service requirement to allow for spotting meter locations, processing contracts, scheduling work and inspection.
- b) 100A and 200A individual services
A 2" corrosion resistant conduit is to be run from a 200A meter base to approximately 3' below grade and terminated with a suitable bushing.

Service conductors from the meter base to service entrance equipment shall be in accordance with the Inspection Department requirements.

- c) The arrangement of a separate conduit from the meter base to the service equipment, installed to meet the Inspection Department requirements, is mandatory for both service ratings.
- d) On the multiple meter base troughs a 2" corrosion resistant conduit is to extend from the trough to a point 3' below finished grade and terminate in a suitable anti-short bushing.

The developer shall supply and install a 2" PVC or equivalent duct suitable for direct burial and

approved by the Ontario Hydro Inspection Dept. for installation of the service wires from a point on the street line or easement line to the meter base. At such point the duct is to terminate as follows:

- (i) in non-court areas: 1' inside the front corner projection of the meter side of the premises.
- (ii) in court areas or short radius crescents: 1' inside the side property line on the meter side of the premises. At the meter end, the duct is to terminate out from the building wall approximately 18" and approximately 1' from the conduit riser to the meter.

3. Location of Service

—see under "IX Requirements for Residential Metering" for Hydro requirements. The standard practice for the Hydro is to bear the costs of providing service to meter locations within 10' of the front of the building. If it is desired to locate meter bases further back than 10' on a building the Hydro Engineering Department will specify the required fee for such an extension.

4. Ownership of Service

After being energized, the entire service out to the street line, or to the point of connection to the supply conductors, whichever applies, shall belong to and become the responsibility of the owner of the property being served by it.

5. Information

For any additional information or guidance, contact the Hydro Engineering Department 522-6611, Ext. 245.

IX REQUIREMENTS FOR RESIDENTIAL METERING

1. Single Family

- a) All new residential service installations must provide for detachable, plug-in type, outdoor meters.
- b) The Party installing such services must contact the Hydro Meter Department in advance and request that an acceptable meter location be "spotted" in the field.
- c) A Meterman will be dispatched to the site and will attach a card to the building at the location selected.
- d) The location of the meter must provide clear and easy access for Hydro Meter readers and servicemen at all times under all weather conditions—the driveway side of the residence is usually the only side that will provide an acceptable location.
- e) See Fig. 2 for further detail.
- f) A 100 Ampere service is the minimum size of service that can be installed in any new residence to be supplied from Hydro lines.
- g) The meter socket is to be supplied by the owner and must be installed in and form part of the service or sub-service conduit. It must be on the supply side of service protective and

control devices such as circuit breakers, fuses and switches associated with the service.

- h) All meter sockets installed must be CSA approved "S" type only with sealing ring and unpainted grounding terminals. Provision for flat rate water heater connections is not required and new or "change of occupant" water heaters must be metered. See XVII-b)
- i) Each new house requiring a service connection must be identified by either its Lot number or its Municipal number shown conspicuously thereon.
- j) See Fig. 2 for meter arrangement and distribution panel layout.

2. Duplexes and Multiplexes

Where residential structures consist of more than one self-contained living unit and each unit and the land on which it is situated can be sold separately, then each is entitled to an individual meter and the metered services must conform to the Hydro requirements for "Single Family Residences", see "IX-1".

3. Row Housing Blocks

- a) Where the land is common property and only the living quarters in the block may be sold (condominiums) or rented, all meter sockets for each block must be installed in a horizontal line, using meter troughs, on one end of such block. Separate services to townhouse units

are mandatory where property and building can be purchased by occupants and firewalls are part of the construction.

- b) Loads must be connected in a left-to-right sequence, corresponding to the ascending numerical order of living units, with upper units considered as having higher numbers than lower units and thus being to the right.
- c) It will be necessary for the Developer or Electrical Contractor to contact the Hydro Engineering Department in advance to discuss the plans for such multiple housing arrangements so a mutually acceptable location for meters can be determined for each block.

X REQUIREMENTS FOR COMMERCIAL AND INDUSTRIAL METERING

1. Location and Classification

- a) Provision must be made for indoor metering on all installations of service equipment to serve loads other than residential loads, with the exception of apartments and condominiums. Any new commercial electric water heaters must be metered.
- b) For Commercial Services—all single phase and three phase services serving stores,

offices, schools, public buildings, churches, hospitals, hotels, motels, restaurants, warehouses, clubs, theatres, service stations, car washes, laundries, dry cleaners and other similar premises shall be classified as commercial services and billed at the Commercial Rate.

- c) For Industrial Services—all single phase and three phase services serving loads for processing or manufacturing purposes, including Municipal Pumping Stations, shall be classified as industrial services and billed at the Industrial Rate.
- d) In all installations, provision must be made to connect the meters on the load side of the service switch or breaker in a location “spotted” by an agent from the Hydro Meter Department.
- e) Subject to prior approval by the Hamilton Hydro Meter Department, socket-type plug-in meters may be used on commercial or power single phase or three phase services up to and including a capacity of 200 amperes. Metering to be located inside and on the load side of service switch or breaker as in d) above and 200 ampere sockets to have jaw-levering device. See Fig. 12
- f) See Fig. 4, 5, 6, 7, & 12 for typical arrangement of meters, service switches and metering transformers, where required.

2. Meter Space

- a) All three phase and all single phase services that are either Commercial or Industrial, according to the usage of the load to be metered, shall have metering space provided indoors on suitable walls or in rooms where space can be dedicated to Hydro metering only.
- b) Where several areas in one building or plaza require individual meters, these meters shall be in groups as large as is practicable. The number and location of such meter groupings must be acceptable to Hydro and each group must have a separate outside access where possible.
- c) The meter location shall provide safe and easy access to the meters and associated service equipment at all reasonable times for visits by Hydro meter readers and service personnel.
- d) Safe working space shall be provided around the area to be occupied by the meters and service equipment, which shall consist of not less than 78 inches of head room for the full width of the installation and a clear working space of at least 36 inches in front.
- e) Such space is not to be considered available for, or used in performing service or maintenance work on other equipment in the near vicinity that could jeopardize the safety of the meters.

- f) The total space provided for Hydro meters and metering equipment and for safe working clearances shall not be encroached upon nor be interfered with by water, gas, sewers or other pipes and any metering that may form part of such systems.
- g) All Communication and Co-axial installations shall be kept clear of Hydro metering space.

3. Mounting of Meters

- a) Meters shall not be mounted inside of or on the doors of current transformer boxes or compartments.
- b) The tops of the meters shall **not** be more than 6 feet above the floor level.
- c) A 3/4 inch wood panel attached to the wall with 1/2 inch strapping shall be provided for mounting the meter required on each metered service. If 1-inch plywood is used, strapping is not required. A minimum of 1-inch depth is required for the meter mounting screws.
- d) The top of the fitting from which the meter loops emerge shall be 4 feet above the floor.

4. Metering Transformer Boxes

- a) Boxes for current transformers shall be mounted with the tops not more than 4 feet above floor level (4'2" for 48" x 48" boxes) and shall have provision for sealing the doors in the closed position.
- b) 20" x 30" x 10" boxes shall be hinged to open

downwards while 36" x 36" x 12" boxes shall open to right or left and 48" x 48" x 12" boxes may have double doors hinged at the outside edges.

- c) See Fig. 6 & 7 for typical installation.
- d) See Fig. 11 for sizes of current transformer boxes required for various loads and service voltages.

5. Meter Connections

- a) All meter loops for bottom connected self contained meters must be stranded copper—Aluminum meter loops are not compatible with this type of meter and are, therefore, not acceptable.
- b) Self-contained meters cannot accept a wire larger than #1/0 and with some types it must be smaller.

6. Graphic or Pulse Metering

Where graphic or pulse meters are required, the customer must provide a suitable panel located remotely from his switchgear or provide sufficient clear space on the switchgear for installation of the metering equipment. Details and space requirements can be obtained from Hamilton Hydro Engineering Dept.

XI DOMESTIC AND COMMERCIAL SERVICES IN THE SAME BUILDING

1. Supply

It is a condition of every contract for service that when a building is used for both commercial and domestic purposes, it shall be supplied by one main service.

2. Sub-services

The commercial and domestic premises shall be served by sub-services from the main service and the sub-services shall be metered and billed separately at the respective domestic and commercial rates.

XII MULTI-STORY APARTMENT BUILDINGS AND CONDOMINIUMS

1. Bulk Metering

Entire load measured on one meter—supplied as a Commercial service—see item X—any additional metering required must have prior approval of Hydro Engineering Department.

2. Individual Metering

- a) Each self-contained living space, the common space in the building and the three (3) phase requirements shall have separate meters. Separate domestic services must be single phase 120/240 Volts.
- b) Where more than one meter location is required, each additional location shall

contain the greatest number of meters that can be conveniently grouped.

- c) Wall recesses in hallways are acceptable in lieu of proper meter rooms and each shall have sliding or folding doors, with provision for locking, installed so that neither they nor their frames interfere in any way with meters, switch handles or doors, splitters, etc.
- d) Layout for apartment meters shall provide meter spacing of at least 8 inches centre to centre horizontally with the switches on the load side of the meters. See Fig. 3
- e) Meter sockets are not permitted below the splitter.
- f) The splitters shall be positioned so that the use of 4" minimum length nipples will place the lowest meters at a minimum height of 3 ft. above the floor. The highest meters shall not be more than 6 ft. above the floor.
- g) Combination splitter—trough assemblies must have drawings submitted to the Hydro Meter Department for approval before such installations can be considered acceptable.
- h) In all cases the service switch for each apartment shall be permanently identified with the same number as that used to number the apartment it serves.

XIII MARKING OF SERVICE BOXES AND RELATED METERED AREAS

- a) Rule 6-224 of the Canadian Electrical Code, Part 1, C22-1, reads as follows:

"If there be more service boxes than one, each such box shall be labelled in a conspicuous, legible and permanent manner, to indicate clearly which installation or portion of an installation it controls."

The Hydro requires that such identifying numbers or letters be AT LEAST 1½" high and that they be painted directly on to the service boxes. White paint should be used on black boxes and black paint on the light grey surfaces.

- b) Black India ink and a rubber stamp may also be used on light grey finishes provided that the surface is suitable and a permanent indelible marking is effected.
- c) Please note that labelling, stuck on with some form of glue or contact cement, or inserted in card holders, or fixed with removable screws, etc., is not considered permanent and will not be accepted.
- d) The Hydro also requires that the doors or entrances to separately metered apartments, offices and stores or other areas in shopping plazas or commercial complexes be identified with their **permanent** numbers BEFORE

service is provided to such areas. These numbers may be painted or they may be of metal, but in any case, the numbering must be permanent and not subject to confusion due to the action of decorators, etc.

XIV TEMPORARY AND SEASONAL SERVICES

- a) Temporary services for construction sites and similar projects may be supplied at a specified voltage and phase with all installation and removal costs being chargeable. A nominal deposit is required before construction is started. Approved rate structures in effect at the time shall apply. See Item c) below.
- b) Seasonal services for refreshment or produce booths or other seasonal usage may be supplied at approved rate structures with a yearly charge for connection and disconnection of this service. The total cost of providing such a service is chargeable to the consumer and a construction deposit is required before construction is started.
- c) If mounted outdoors, the service equipment shall be of weatherproof construction with a weatherproof enclosure provided for the meters with provision for padlocking or sealing the enclosure door in the closed position.

XV MAXIMUM STARTING CURRENTS

1. Single Phase Air Conditioners Including Residential

The maximum allowable starting current is 115 amperes at 240 volts and 50 amperes at 120 volts.

2. Three Phase Line Start Motors

When service is supplied from the three phase district secondary system, the use of line start motors of over 10 H.P. at 240 volts or 25 H.P. at 600 volts is not permitted. When service is from a transformer installation supplying the consumer only, special permission must be obtained for the use of larger line start motors.

XVI ELECTRIC HEATING

For electric heating estimates and information concerning electric heating contact the Hamilton Hydro Customer Service Dept.

XVII ELECTRIC WATER HEATERS

- a) 40 and 60 gallon electric water heaters may be rented or purchased from Hamilton Hydro.

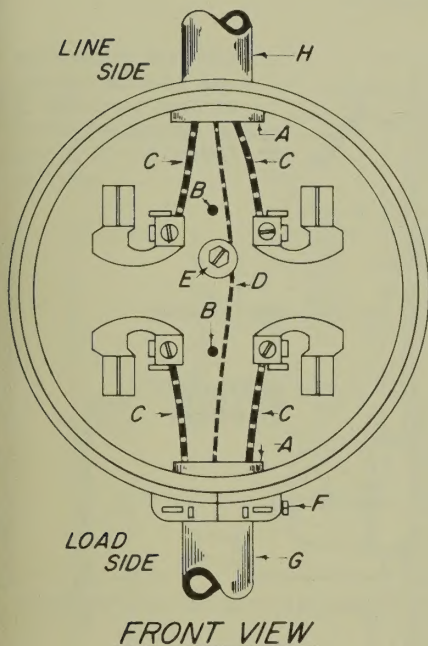
- b) All new electric water heater installations must be connected for metered consumption and where a change of occupancy (owner or tenant) requires the signing of a new contract for service, any existing flat rate water heaters associated with that service will be changed over to the metered supply.
- c) Contact the Hamilton Hydro Customer Service Dept. for sizing commercial rental electric water heater installations.

XVIII CONTRACTS FOR SERVICE

- a) Regardless of a service location having been approved, Hydro construction which may be required to provide service cannot be initiated until an application or contract has been signed for that service by the party immediately responsible for payment of energy accounts, and two or more weeks may be required from that time to fit the required work in to the work schedule.
- b) To avoid delays in connecting new or increased capacity services, the ELECTRICAL CONTRACTOR, who is in touch with the work in progress, should supply the voltage and estimated demand figures to the party (general contractor, owner or tenant) who will be paying the Hydro bills initially, and have them

SIGN A HYDRO CONTACT in sufficient time to allow for any construction required to provide for that service.

WIRING DIAGRAM & LAYOUT FOR OUTDOOR TYPE DETACHABLE WATTHOUR METER



NOTE

- 1-CENTRE OF SOCKET TO BE 6'-9" ABOVE FINISHED GRADE (APPROX.)
- 2-SOCKET MUST BE MOUNTED IN A VERTICAL PLANE & CONDUIT INLETS MUST BE VERTICAL TO AVOID TILTING METER.
- 3-NEUTRAL WIRE MUST BE BARED ONLY, NOT CUT, AT GROUNDING TERMINAL

METER SOCKET SUPPLIED BY
OWNER OR CONTRACTOR

- A - PIPE THREADED ENTRANCE BOSS.
- B - MOUNTING HOLES SHOULD BE USED OR FILLED.
- C - INSULATED SERVICE CONDUCTORS.
- D - NEUTRAL CONDUCTOR (SEE NOTE NO.3)
- E - GROUNDING TERMINAL (PAINT MUST BE SCRAPPED FROM CONTACT SURFACES).
- F - SEALING RING FASTENER. (MUST BE AT BOTTOM OF SOCKET)
- G - CONDUIT CARRYING SERVICE CONDUCTORS.
- H - SERVICE CONDUIT.

FIG. 1

DOMESTIC SERVICE
STANDARD

**OUTDOOR DETACHABLE METER
WITH SWITCH OR CIRCUIT
BREAKER PROTECTION**

ON SERVICES UP TO 125 AMPERES
NEUTRAL WIRE MUST BE BARE OR
IN WHITE INSULATION. TAPED
IDENTIFICATION WILL NOT BE
ACCEPTED

SEE ONTARIO ELECTRICAL
CODE

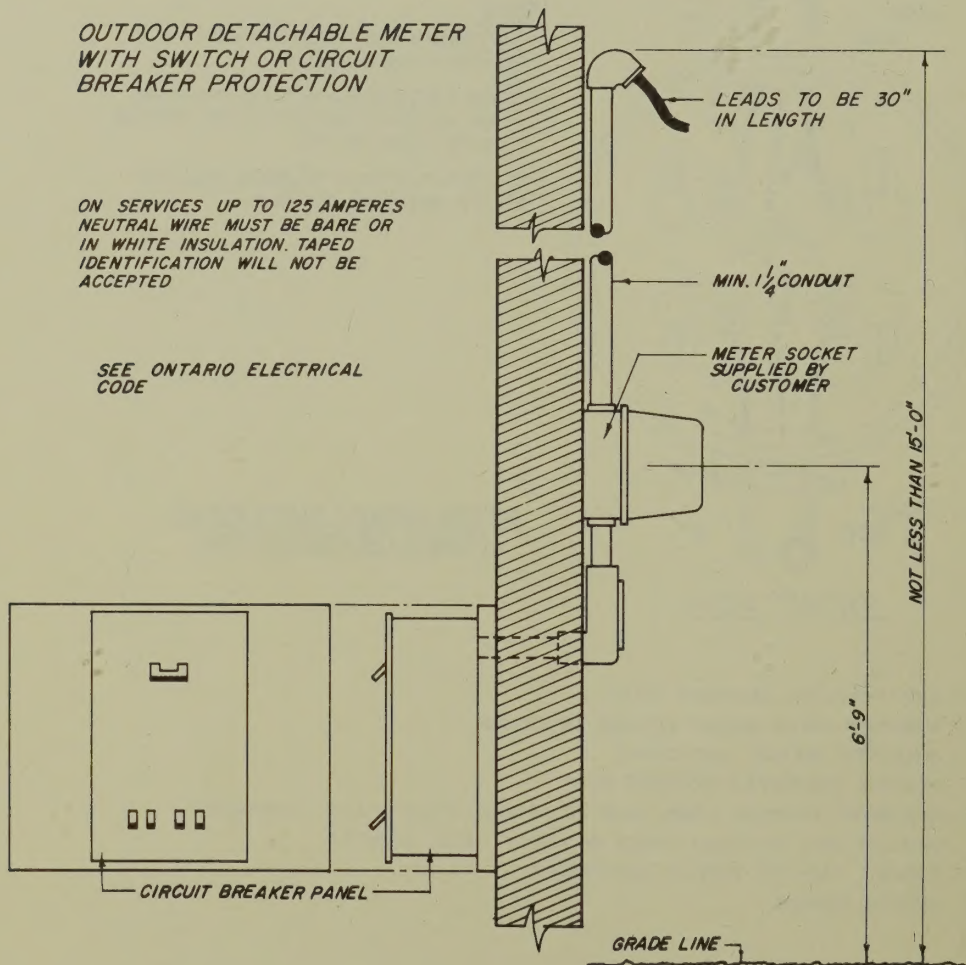
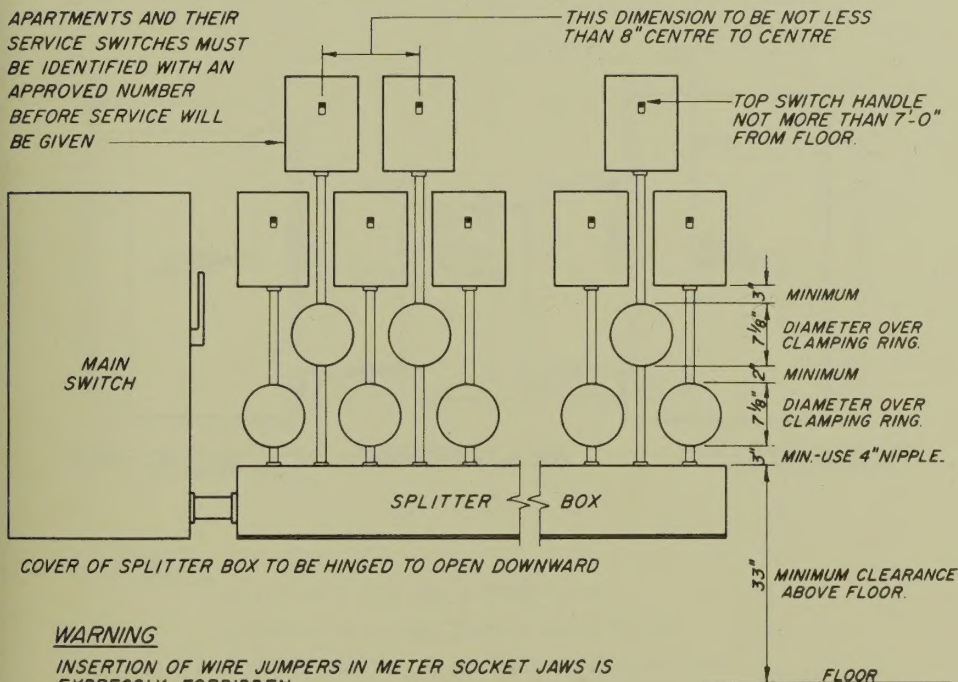


FIG.2

TYPICAL METERING LAYOUT FOR DOMESTIC SERVICES IN APARTMENTS AT 120/240V.



WARNING

INSERTION OF WIRE JUMPERS IN METER SOCKET JAWS IS EXPRESSLY FORBIDDEN.

FLAT CONNECTIONS FOR TESTING OR ANY OTHER PURPOSE ARE NOT PERMITTED.

TESTING ENERGY WILL USUALLY BE AVAILABLE FROM A METERED CIRCUIT. CONNECTION SHOULD BE MADE TO THE LOAD SIDE OF THE APARTMENT SWITCH.

NOTE

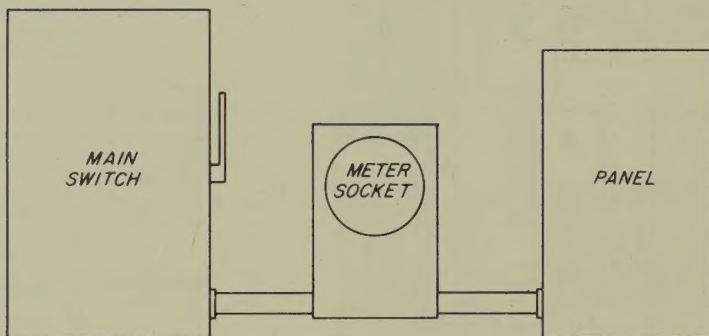
SOCKETS ARE NOT PERMITTED BELOW SPLITTER TROUGH

WHERE FACTORY ASSEMBLED MULTIPLE POSITION METER PANEL & SWITCH ARRANGEMENTS ARE USED, SOME DEVIATION FROM THE STANDARD HEIGHT OF THE METERS MAY BE PERMITTED. HOWEVER, DETAILED DRAWINGS MUST BE SUBMITTED TO THE H.E.S. FOR APPROVAL BEFORE INSTALLATION.

FIG. 3

TYPICAL SELF-CONTAINED
COMMERCIAL METER INSTALLATION

120/240 VOLT SINGLE PHASE
200 AMPERES OR LESS



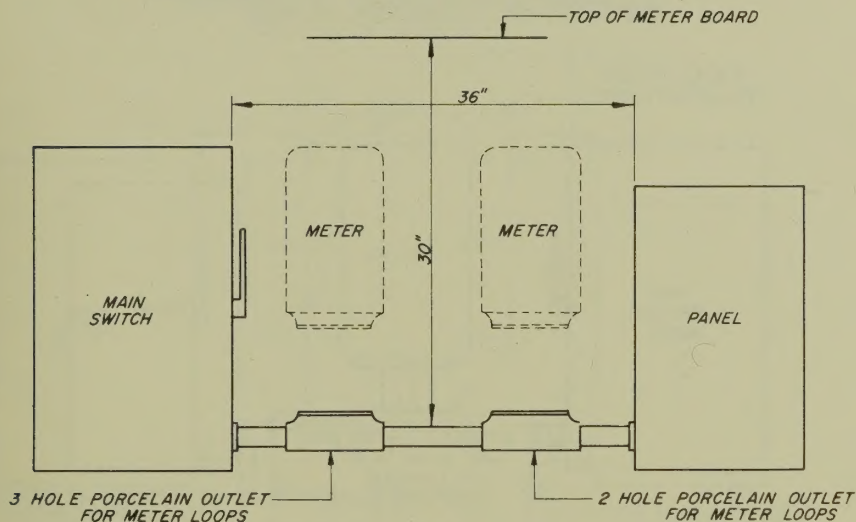
SEE ALSO FIGS. 6 & 10

NOTE.

1. BOTTOM OF METER TO BE NOT LOWER THAN 4' FROM FLOOR.
TOP OF METER NOT OVER 6' ABOVE FLOOR.
MINIMUM SPACE REQUIRED FOR METER...12" WIDTH X 22" HEIGHT.
2. A $\frac{3}{4}$ " WOOD PANEL MOUNTED ON WOOD STRAPPING MUST BE PROVIDED FOR MOUNTING THE METER, TO ACCOMMODATE THE PROTRUSION OF WOOD SCREWS.

FIG. 4

TYPICAL SELF-CONTAINED 3 PHASE, 3 WIRE POWER METER INSTALLATION



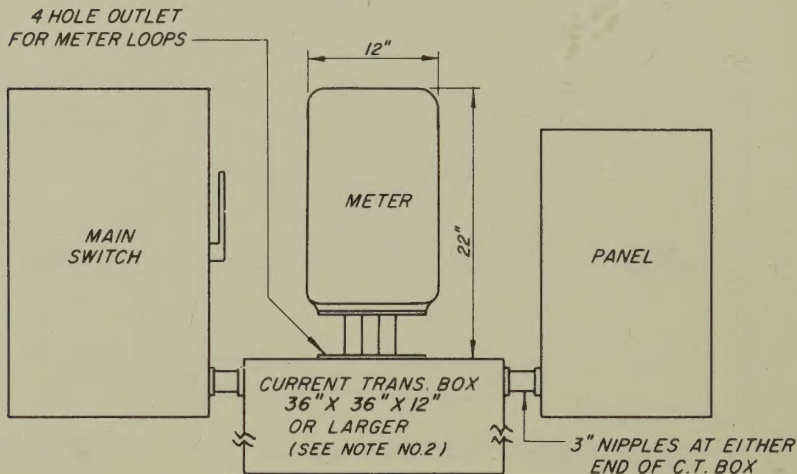
NOTE.

1. TOP OF "C" FITTING 4' FROM FLOOR.
2. TOP OF METER NOT OVER 6' ABOVE FLOOR.
3. POTENTIAL TAP TO BE TAKEN TO METERS THRU PORCELAIN OUTLET FROM UNUSED CONDUCTOR IN MAIN BOX.
4. MINIMUM SPACE REQUIRED FOR METERS... 36" WIDE
30" HIGH
5. IF 2 FITTINGS ARE USED, METER LEADS MUST BE LONG ENOUGH TO REACH TERMINALS OF SINGLE METER INSTALLATION.

FIG. 5

TYPICAL COMMERCIAL LIGHTING INSTALLATION USING A 3 WIRE CURRENT TRANSFORMER

GREATER THAN 200 AMPERES CAPACITY - SOCKET ONLY
PERMITTED FOR 200 AMPERES OR LESS



SEE ALSO FIG.13

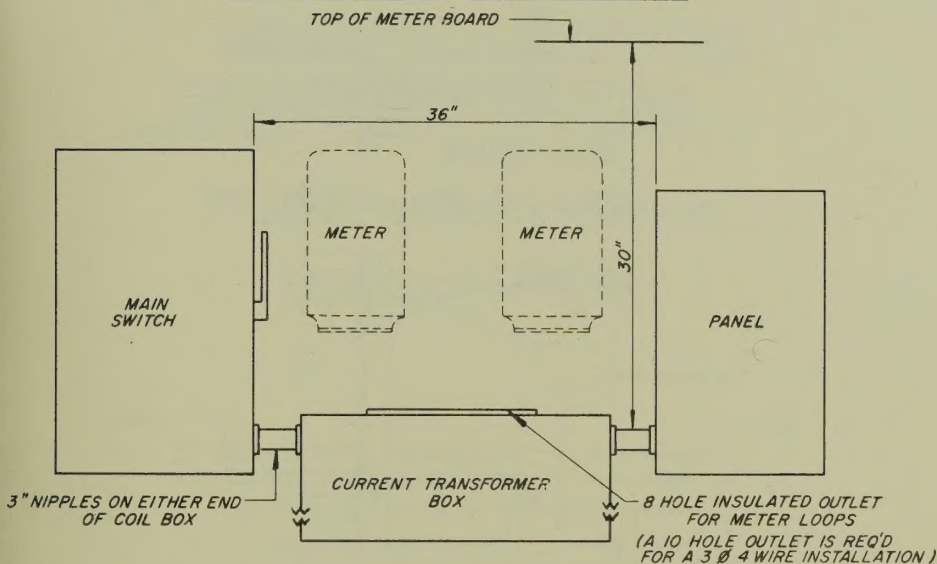
TOP OF COIL BOX TO BE 4' ABOVE FLOOR LEVEL (4'-2" FOR 48"X48")
WITH COVERS HINGED TO OPEN TO RIGHT OR LEFT FOR 36"X36"
BOXES, AND TO RIGHT AND LEFT FOR DOUBLE DOORS ON
48"X48" BOXES.

NOTE..

1. A 2-POLE KNIFE SWITCH IS USED IN THE METERING POTENTIAL CIRCUIT.
2. WHERE CONDUCTORS LARGER THAN 250 MCM. ARE USED OR WHERE THERE ARE 2 OR MORE CONDUCTORS PER PHASE, A BOX 48"X48"X12" MAY BE REQUIRED, CHECK WITH H.H.E.S. METER DEPT. IN SUCH CASES.
3. METERS ARE NOT PERMITTED TO BE MOUNTED INSIDE COIL BOXES.

FIG. 6

TYPICAL 3 PHASE, 3 WIRE
POWER INSTALLATION USING 2-2 WIRE
CURRENT TRANSFORMERS



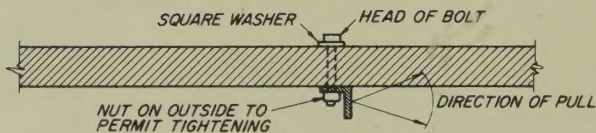
NOTE.

1. TOP OF COIL BOX TO BE 4' ABOVE FLOOR LEVEL (4'-2" FOR 48" X 48") WITH COVERS HINGED TO OPEN DOWNWARDS ON 20" X 30" BOXES, TO RIGHT OR LEFT FOR 36" X 36" BOXES, AND TO RIGHT AND LEFT FOR DOUBLE DOORS ON 48" X 48" BOXES.
2. A TEST BLOCK IS USED IN METERING CURRENT AND POTENTIAL CIRCUITS.
3. H.H.E.S. WILL SUPPLY AND INSTALL COLOUR CODED POTENTIAL TAP FROM UNMETERED CONDUCTOR IN MAIN SWITCH ON 3 PHASE 3 WIRE INSTALLATIONS OR FROM THE NEUTRAL TERMINAL ON 3 PHASE 4 WIRE SERVICE.
4. METERS ARE NOT PERMITTED TO BE MOUNTED INSIDE COIL BOXES.
5. ON 3 PHASE 4 WIRE INSTALLATIONS, 3 CURRENT TRANSFORMERS ARE USED AND UP TO 2 POTENTIAL TRANSFORMERS MAY ALSO BE REQUIRED.

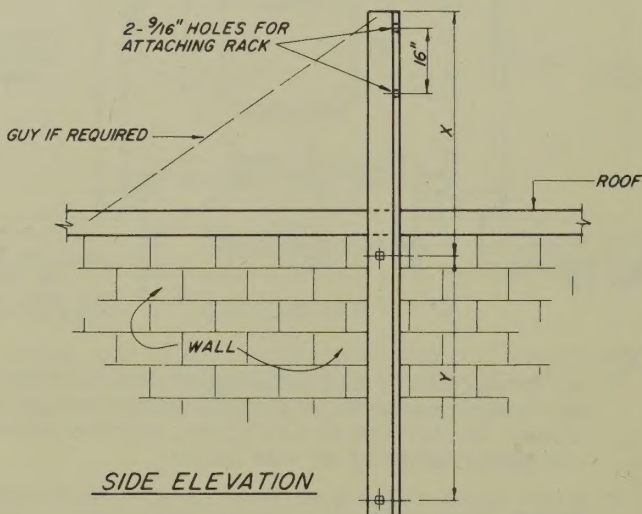
FIG. 7

ANGLE IRON MAST

MIN. SIZE... 4"X 4"X $\frac{3}{8}$ "



SECTION THRU WALL, LOOKING DOWN



SIDE ELEVATION

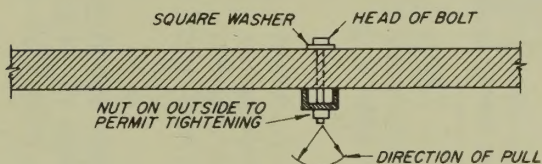
NOTE

1. IF GUY IS REQUIRED, IT SHOULD BE APPROXIMATELY IN LINE WITH PULL OF SERVICE & SHOULD EXTEND 4' FROM MAST FOR EVERY 3' OF EXTENSION.
2. DISTANCE BETWEEN THRU BOLTS (Y) SHOULD BE 5' OR MORE AND SHOULD EQUAL OR EXCEED THE DISTANCE BETWEEN TOP THRU BOLT & TOP OF MAST (X).

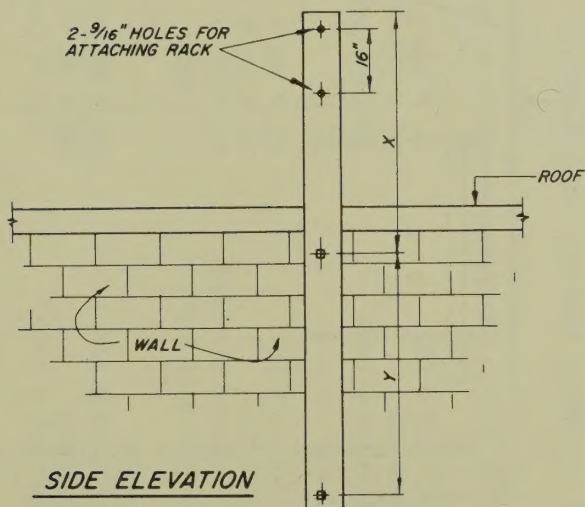
FIG. 8

CHANNEL IRON MAST

MIN. SIZE... 6"X 2" at 13 lbs./ft.



SECTION THRU WALL, LOOKING DOWN

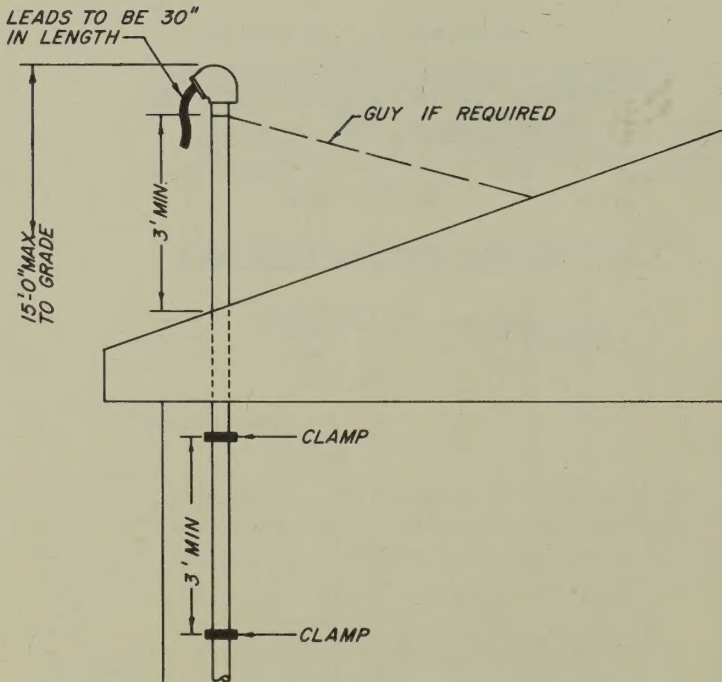


NOTE.

DISTANCE (Y) BETWEEN THRU BOLTS SHOULD BE 5' OR MORE AND SHOULD EQUAL OR EXCEED THE DISTANCE (X) BETWEEN TOP THRU BOLT AND TOP OF MAST.

FIG. 9

PIPE MAST



NOTE

1. IF GUY IS REQUIRED, IT SHOULD BE APPROXIMATEY IN LINE WITH PULL OF SERVICE AND SHOULD EXTEND 4' FROM MAST FOR EVERY 3' OF EXTENSION.
2. SEE SECTION 1-2(B) - PAGE 4

FIG. 10

HAMILTON HYDRO METERING REQUIREMENTS FOR VARIOUS SERVICE VOLTAGES AND LOADS

INDOOR METERED SERVICE	RATING OF SERVICE	SIZE OF CT BOX REQUIRED	MINIMUM SPACE REQUIRED FOR EACH METER
Single Phase 3 Wire			
120/240 Volt	200 Amp & Less	Socket Only	12" wide & 22" high
	400 Amp	36" x 36" x 12"	Space above CT box—27" high
	600 Amp & Up	48" x 48" x 12"	Space above CT box—27" high
3 Phase 3 Wire			
600 Volt 240 Volt	30 Amp & 60 Amp	N/A	12" wide & 22" high
	100 Amp & 200 Amp	20" x 30" x 10"	Space above CT box—27" high
	400 Amp	36" x 36" x 12"	Space above CT box—27" high
	600 Amp & Up	48" x 48" x 12"	Space above CT box—27" high
3 Phase 4 Wire			
347/600 Volt 240/416 Volt 120/208 Volt	200 Amp & Less	Socket Only	12" wide & 22" high
	400 Amp	36" x 36" x 12"	Space above CT box—27" high
	600 Amp & Up	48" x 48" x 12"	Space above CT box—27" high

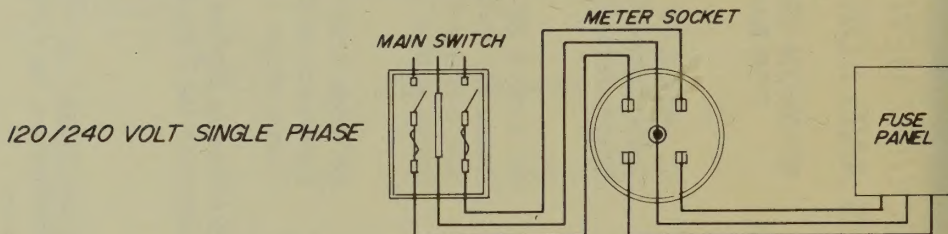
Hamilton Hydro will install plug-in type Demand Meters on single phase or 3 phase 4 wire services of 200 Amps Capacity or less. Plug-In meters are not approved in Hamilton for 3 phase 3 wire services.

AUTOMATIC BY-PASS SOCKETS ARE NOT ACCEPTABLE

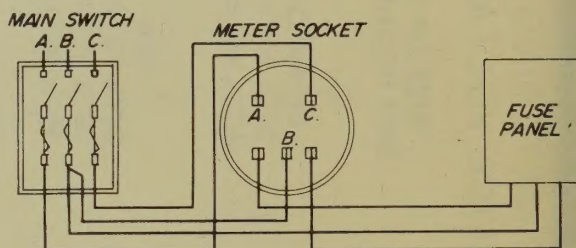
NOTE: When the service equipment is to consist of high-current switchgear, arrangements should be made with the Supplier to have the current transformers, as supplied and owned by the Hamilton Hydro, installed during manufacture.

FIG. 11

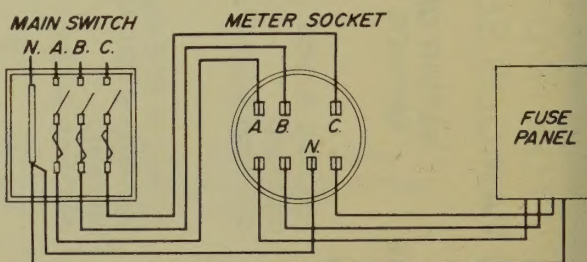
CONNECTIONS FOR SOCKET TYPE SINGLE & THREE PHASE COMMERCIAL & POWER METERING



5 JAW SOCKET FOR 3 PHASE 3 WIRE "DELTA" SYSTEM. THROUGH PHASE TIES IN AT 6 O'CLOCK POSITION. WITH *12 WIRE FROM MAIN SWITCH. N.B. - 5 JAW SOCKETS ARE NOT ACCEPTABLE IN HAMILTON AT PRESENT



7 JAW SOCKET FOR 3 PHASE 4 WIRE "WYE" SYSTEM. "N" POSITION IN SOCKET TIES IN TO NEUTRAL IN MAIN SWITCH WITH *12 WIRE.

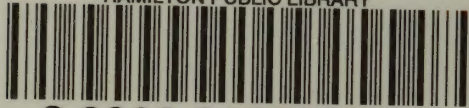


NOTE

1. - 200 AMPERE MAXIMUM CAPACITY.
2. - 200 AMPERE SOCKETS TO HAVE LEVER FOR SPREADING JAWS.
3. - MAIN SWITCH MUST BE AHEAD OF SOCKET & BE SEALABLE.
4. - METER HEIGHT BETWEEN 4 FEET & 6 FEET ABOVE FLOOR LEVEL.
5. - LINE & LOAD LEADS MUST BE PULLED IN WHEN SERVICE INSTALLED.
6. - LOCATION MUST BE INSIDE & APPROVED
7. - PHASING AS ABOVE MUST BE ADHERED TO.

FIG. 12

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